

Introduction: Purpose and Scope of This Report

This report was commissioned by and prepared under the direction of the Washington State Transportation Commission, chaired by Commissioner Alice Tawresey. The purpose of the report is to develop a plan for expanded and improved passenger-only ferry (POF) service in Puget Sound, and to present the plan to the Legislature. As directed by the Commission, the report focuses on implementation of two new POF routes: Kingston-Seattle and Southworth-Seattle, and improved service on the Vashon and Bremerton POF routes.

This implementation plan was funded by the 1993 Legislature, in connection with the Puget Sound Transportation Investment Program budget appropriation. The project was managed by the State Department of Transportation's Transit, Research and Intermodal Planning (TRIP) Division, in close coordination with the Marine Division. Throughout the project's duration, there has been significant involvement by 3 groups: a legislator advisory committee; a Marine Division technical working group; and a project management team comprised of Commission, Kitsap Transit, TRIP and Marine Division representatives. (The members of these groups are listed on the inside cover of this report.) In addition, board members of the Kitsap Regional Council were briefed and consulted twice during the 6-month project.

The involvement of all of these groups reflects a strong desire to obtain broad input from stakeholders on all aspects of the study. In particular, the expertise, experience and input of Marine Division staff was sought, in order for the recommended program to be as realistic, workable and implementable as possible. Toward that end, numerous small group meetings were held with Division staff to discuss the specifics of POF operation and maintenance issues.

Report Organization

This report is organized into two documents: an implementation plan and a technical appendix. The implementation document serves as an executive summary of the project, and summarizes the study's findings and recommendations for vessel acquisition, service and fleet plans, operations and maintenance staffing, and terminal designs and construction. It also discusses scheduling issues and constraints, and presents analysis of ridership demand, financial and governance issues.

The appendix contains detailed technical reports on the naval architecture and marine engineering portions of the study including the vessel selection process; route, service and system alternatives analyses; maintenance planning and staging; and terminal design, construction, operation and maintenance issues. The appendix also contains a background report on the history of POF operations in the state including a compendium of Transportation Commission actions on the issue; a discussion of private sector involvement and public-private partnership approaches to POF service; an analysis of ridership demand; an analysis of capital and operating funding needs and revenues; and a discussion of alternative governance structures for POF system ownership and operation.

History of the Passenger-Only Ferry Program to Date

Vessel Acquisition and Service Development Has Been Incremental

Washington State Ferries' (WSF) history of providing passenger-only ferry service began in the summer of 1978, when the Division, in conjunction with Boeing, offered POF service for a 6-week trial period. A 300-passenger, 43-knot Boeing Jetfoil ran between Seattle and Port Orchard, Bremerton, Poulsbo, Port Angeles, the San Juan Islands, and Victoria, B.C. While the service was enjoyed by the public, it was not considered successful by WSF due to the high operation and maintenance costs associated with the Jetfoil.

Passenger-only ferry issues were then dormant until 1984, when WSF prepared its plan for 1990-2000. The report, entitled *Washington State Ferries Long-Range Plan Update 1990-2000*, highlighted worsening traffic and congestion trends and a steadily growing volume of passenger traffic on the auto ferries, particularly on the Seattle-Winslow, Edmonds-Kingston and Southworth-Fauntleroy routes. The study recommended the introduction of new passenger-only ferry service providing higher speed and higher frequency service between Seattle and the Bremerton, Vashon and Southworth communities.

Concurrent with the plan update, the City of Bremerton, represented by a business group, was urging the Transportation Commission to concentrate a planned passenger-only ferry demonstration project on Bremerton in an effort to provide better service for Kitsap County commuters and to spur development in the Bremerton area.

In 1985 the Commission responded to these recommendations by authorizing the purchase of one passenger-only vessel for a demonstration project to last through FY 1987. WSF received a \$1.6 million UMTA federal grant towards the \$2.5 million purchase price of the M/V Express (later renamed the Tyee), from Nichols Brothers shipyard on Whidbey Island. The Tyee, a used 319-passenger, 23-knot catamaran, was assigned to the Bremerton-Seattle route.

With the demonstration program considered a success, in the 1987-89 biennium the Legislature approved the purchase of 2 additional passenger-only vessels -- one to serve the Bremerton-Seattle route on a permanent basis and the second to create a new Vashon-Seattle passenger-only route. However, the Legislature placed a cap on vessel acquisition costs, authorizing a maximum of \$5 million, contingent upon 80% of the funds being obtained from the federal government.

In October 1987 vessel bids were issued, and a contract was awarded to a New Orleans-based shipbuilding company, the Equitable Shipyard of the Halter Group. The two additional passenger-only ferries, the Skagit and Kalama, are 112-foot, 250-passenger, 25-knot monohull vessels. They were put into service in 1989.

Operational Problems: Wake-Wash Impacts and Maintenance Issues

In its initial years of operation, the POF program has suffered from a series of vessel mechanical problems and concerns about wake-wash damage to properties along the Rich Passage shoreline. The result of these problems has been service which is slower and less reliable than is desirable. The following section describes specific operational difficulties which were encountered; the next section discusses the lessons learned from the state's experience, and how the proposed program will preclude such problems in the future.

Tyee Engine Failures. The Tyee was purchased with 2 Deutz diesel engines, high-performance, lightweight engines. The Deutz engines were subject to frequent failures which caused the vessel to be taken out of service; the failures were attributed to operating the engines

at maximum power for extended periods. In mid-1992, after one of the engines suffered a disabling breakdown, the Commission approved expenditure of \$1.35 million to replace the Deutz engines with Caterpillar engines, which are more robust, and could provide the required power at 85% of capacity. Since the vessel was re-engined it has performed well.

Kalama and Skagit Design and Operating Specifications. With a spending cap of \$5 million imposed by the Legislature, the Marine Division issued bids for the purchase of two 250-passenger, 25-knot vessels. Only one bid was received -- a sign that, in the highly competitive shipbuilding industry, there was a problem with the bid specifications and price limit. Nonetheless, the state accepted the bid and ordered the vessels. The state did not specify that the boats be catamarans; the vessels offered and delivered were monohulls.

As with the Tyee, running the vessels at maximum speed overtaxed the engines and resulted in mechanical breakdowns. To assure greater reliability, the Ferry System was forced to throttle down the engines to about 20 knots. In addition, the vessels' propulsion system proved to be inappropriate for Puget Sound water conditions; the Sound has quite a lot of floating debris such as logs (called deadheads) which struck the boat's propellers. Repairing propeller damage requires the boats to be in dry dock, which takes them out of service for a day. Consequently, both monohulls have been out of service much more frequently than is desirable.

Wake-Wash Issues. Shortly after POF service was initiated with the Tyee between Bremerton and Seattle, complaints of wake-wash damage were voiced by property owners along the Rich Passage shoreline. Complaints made included erosion of the sand and gravel beaches along the shoreline, physical damage to bulkheads and adjacent property, and biological impacts such as loss of clam beds, disappearance of offshore kelp beds and killing of crabs.

The state responded to these complaints by limiting the Tyee's speed through Rich Passage, and issuing bid specifications for the Kalama and Skagit which called for 45-minute Bremerton-Seattle transit time, including sufficient slowing in the narrowest 1 mile of the Passage to limit the wake to a 9-inch height measured 350 feet from the vessel's track, a wake-wash height then thought to be acceptable. When delivered, the Skagit and Kalama met the contractual criteria for underway time on the route. However, complaints from shoreline residents increased. The higher, more energetic wake produced at full speed by these vessels traveled for longer distances, and residents at new locations beyond the 1-mile narrowest choke point of the passage voiced concerns. Consequently, the wake-wash impact area was broadened and WSF commissioned a consultant study to analyze the problem.

The study conducted by Hartman and Associates found that, while no permanent damage occurred during the 6-week period in which the monohulls had operated at high speed in the Passage, if they continued at full speed, the natural erosion of beaches and deterioration of bulkheads would probably be accelerated.

Therefore, WSF slowed the vessels' speed to less than 12 knots from the east entrance of Rich Passage to Bremerton. Twelve knots was chosen because prior experience with the Tyee had established that no wake-wash complaints were received when operating at that speed. Reducing the vessels' speed increased POF travel time between Bremerton and Seattle from 40 to 55 minutes; a savings of only five minutes over the auto ferry.

Lessons Learned from the State's POF Experience

A number of important lessons have been learned from the state's experience with passenger ferries over the past half-dozen years:

1. **Propulsion system.** Sailing conditions vary from location to location. Puget Sound's high tidal current velocities require a vessel with excellent maneuverability and controllability, particularly at low speeds. Additionally, the Sound has floating debris which can damage boat hulls, and makes propeller-driven propulsion systems unworkable. The solution to these operating constraints is to specify waterjet propulsion. Waterjets are infinitely variable from zero to full thrust, permitting excellent control, and are not subject to problems with deadheads and snagged debris.
2. **Vessel design.** A catamaran design is preferred over a monohull. The catamaran configuration provides passengers with a smoother ride and reduces wake-wash impacts.
3. **Engine capacity.** Engines cannot be routinely run at 100% of their listed capacity; 85% of capacity is the recommended operating level.
4. **Engine specifications.** Engines selected for use in the POF fleet must be compatible with WSF maintenance and support philosophies; robustness is preferable to high-tech in engine design.
5. **Wake-wash prediction and specification.** The state's experience with the Skagit and Kalama has had several results: (a) WSF has established new, more stringent wake-wash specifications; (b) improved predictive and computer modeling tools have been developed, which generate estimated wake profiles for any given vessel; and (c) overall, there has been a significant advance in the understanding of the wake-wash phenomenon. Thus, whereas when the Skagit and Kalama were purchased it was believed to be sufficient to specify a simple wash height measurement without specifying the measurement conditions, now any new vessel procurement will require that the vessel designer provide hull form and weight data so that analytical predictions of wake-wash can be modeled, as well as requiring measurement of the initial vessel's wake-wash (to validate meeting wash height and energy specifications) before additional vessels are accepted for delivery by WSF.
6. **Vessel pricing.** In vessel procurement, you get what you pay for. Imposing an artificial limit on the purchase price for new vessels may result in substandard or suboptimal features and performance.
7. **Bid specifications and procurement.** Because shipbuilders are in the business of selling boats, marketing claims about vessel performance are not always fully realized. Therefore, rigorous design specification, construction management and pre-acceptance testing are essential.
8. **Maintenance back-up.** Adequate vessel back-up is essential during periods of maintenance and repair. To ensure reliable service, the system operator must be able to replace out-of-service vessels with another of equal size and speed.
9. **Ridership demand.** Despite problems with service frequency and reliability, demand for POF service has been strong during peak periods. There is a loyal (and growing) group

of POF riders who continue to use the service regularly. Passenger demand issues are discussed in more detail in the ridership section below.

Elements of a Successful Passenger Ferry Program

As indicated above, the state has learned a great deal from the POF experience to date. Marine Division staff and others involved with the program have significantly expanded the state's knowledge about POF vessel design and procurement issues, and operating and facility requirements. This base of information and experience should assist the state in moving forward to meet customer demand for an expanded and improved POF program.

Given the checkered history of the state's POF program, there has been an emphasis throughout this project on designing a successful, implementable program, i.e. "setting the system up for success." In fact, the goal of developing a successful program has guided much of the discussion and many of the recommendations regarding system design and planning.

In order to develop a successful program, the first requirement is to define "success." In meetings with legislators, local elected officials and the public, a clear message has been communicated regarding POF service -- reliability and service frequency are critical. Reliability means consistent on-time performance, and service frequency means headways (the time between sailings) of 30-45 minutes or less during peak periods.

Based on this input, we have developed an operational definition of a successful program -- consistently reliable service. Applying this definition to service and facility planning results in several guiding principles. To achieve service reliability -- consistent on-time performance -- requires:

1. An appropriate vessel design for Puget Sound. Catamarans with waterjet propulsion systems are recommended.
2. An adequate number of vessels to provide regularly scheduled, reasonably frequent service throughout the day. In order for riders to rely on the POF system as primary transportation, service must be available at consistent and regularly scheduled intervals.
3. An adequate number of standardized vessels to provide seamless replacement service during scheduled and unscheduled maintenance periods.
4. A realistic, workable schedule. The schedule must provide adequate time for loading and unloading passengers, and for accommodating travel delays caused by weather and other factors.
5. Adequate terminal facilities and capacity to ensure that schedules can be routinely met, and that unscheduled maintenance needs for a particular vessel can be accommodated without disrupting service on other vessels and routes.
6. A separate passenger-only unit with a program manager and staff dedicated to passenger operations and maintenance. This organizational structure will increase the likelihood of program success by increasing the efficiency and accountability of that function.

Ridership Analysis

In order to develop an effective implementation plan for expanded POF service, the appropriate level of vessel and terminal facilities must be designed to accommodate potential ridership demand. Therefore, an analysis of current ridership demand for POF service between Seattle and the Vashon, Bremerton, Southworth and Kingston communities was conducted. **It should be noted that this analysis is not intended as a detailed ridership forecast, but rather to provide an estimate of potential demand for use in sizing the proposed system, and in developing estimates of potential farebox revenues. Only current data were used and no attempt is made here to suggest statistical reliability.**

The results of this analysis show strong demand for direct POF service from each of the 4 west side destinations to Seattle, if service were available on a frequent and reliable basis. As shown in Table 1, total 1993 demand for POF service on these 4 routes is estimated at approximately 12,140 riders per day, or 3.5 million riders per year. Assuming a relatively conservative annual growth rate of 3.5%, passenger demand by 2005 is estimated at 18,345 daily riders, or 5.4 million annual riders.

Table 1
Estimated Market Potential for Passenger-Only Service

	1993		2005	
	Daily	Annual	Daily	Annual
From downtown Seattle to:				
Bremerton	3,400	927,000	5,140	1,401,000
Kingston	4,050	1,215,000	6,120	1,836,000
Southworth	4,140	1,243,000	6,260	1,878,000
Vashon	550	163,000	825	247,000
Total for 4 routes	12,140	3,548,000	18,345	5,362,000

Note: Vashon ridership estimates are lower than current ridership on this route. This is because Southworth riders now using the Vashon service are assumed to transfer to the new Southworth-Seattle route.

Source: WSF, Berk & Associates, 1993

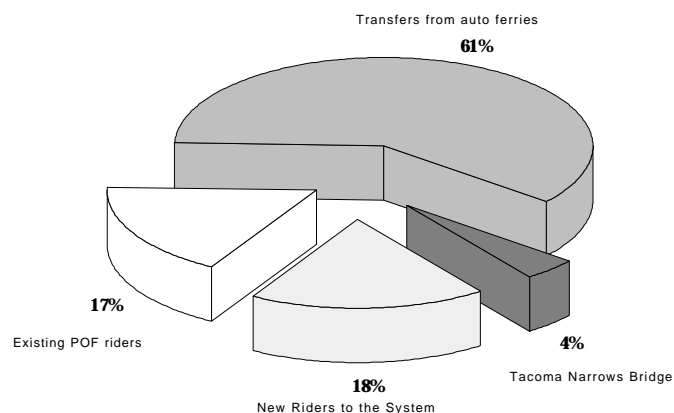
The ridership analysis is based on unusually current data: existing ferry system ridership; an on-board survey conducted by the Department in the spring of 1993 which asked riders if they would use POF service if it were offered from Kingston and Southworth directly to Seattle; a survey of Tacoma-Narrows bridge drivers conducted in the summer of 1993 in connection with the EIS for a new Tacoma-Narrows bridge; and WSF's re-route of Vashon-Southworth ferries to Seattle during a 2-week period in October 1993 when the Fauntleroy dock was under repair.

Taken together, these recently-conducted surveys, the existing rider data base and the Fauntleroy closure/re-route experience provide a level of assurance that there is significant interest in expanded POF service, and that estimates of current POF ridership demand are reasonable.

POF Service as a Transportation Demand Management Mechanism

As Figure 1 shows, POF ridership demand is estimated to be generated by 4 groups: riders transferring from the auto ferries (61%); existing POF riders (17%); induced new riders (18%); and riders transferring from the Tacoma-Narrows bridge commute (4%).

Figure 1
Potential Passenger-Only Market (1993)



Source: WSF, Berk & Associates, 1993

These estimates suggest that an expanded POF program can serve as a transportation demand management mechanism, changing travel behavior from use of the single-occupant auto to high occupancy passenger vessels. Thus, for example, while transfers from the Tacoma-Narrows bridge represent only 4% of total estimated POF ridership, this percentage translates into 500 riders per day -- ferry commuters who would otherwise be driving their cars across the bridge.

Additional information on potential mode shifting as a result of introducing POF service to Kingston and Southworth is available from the on-board survey. Table 2 below shows the reported mode share of survey respondents who stated that they would likely make use of the new service. For the Kingston-Seattle route, 33% of riders who indicated that they would use the service had driven on the ferry the day of the survey. For the Southworth-Seattle route, 20% of all respondents indicating a desire to use the new service had driven on the ferry that day. However, this aggregate figure is skewed by number of potential transfers from the Vashon and Bremerton passenger-only routes. Of the likely transfers from the Southworth-Fauntleroy route, 34% drove onto the boat, and another 11% were passengers in a vehicle.

Table 2
WSDOT On-Board Survey Results:
Reported Mode Use of Likely Transfers

	Walk-on	Drive-on	Passenger	Bicycle	No reply
Kingston-Seattle:					
Kingston-Edmonds	38%	49%	10%	1%	2%
Bainbridge-Seattle	70%	24%	4%	2%	0%
Mode split of all transfers	59%	33%	6%	2%	1%
Southworth-Seattle:					
Bremerton-Seattle auto	87%	9%	4%	0%	0%
Bremerton-Seattle POF	96%	0%	0%	4%	0%
Southworth-Fauntleroy	54%	34%	11%	1%	0%
Vashon-Seattle POF	99%	0%	0%	1%	0%
Mode split of all transfers	72%	20%	7%	1%	0%

Source: Washington State Ferries, Pacific Rim Resources, 1993

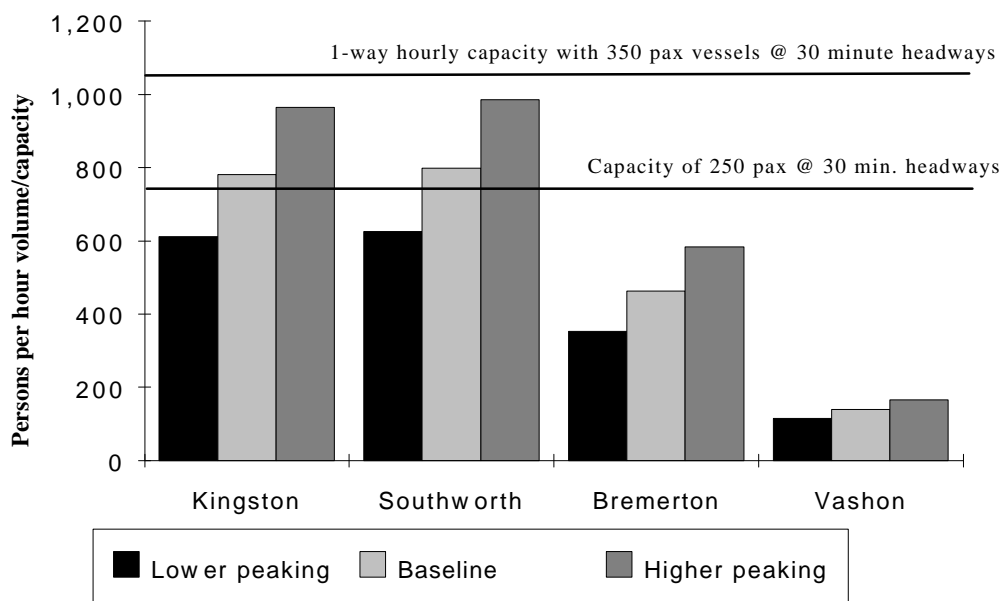
These survey results offer support to the premise that adding passenger-only service between downtown Seattle and Kingston and Southworth will change travel behavior, and encourage individuals to leave their cars at home for commute trips.

Peak Hour Demand and Vessel Size Requirements

Figure 2 shows the one-way, peak-hour demand and capacity requirements estimated for the Kingston, Southworth, Bremerton and Vashon routes by the year 2005. As the figure shows, in order to accommodate estimated baseline demand on the Kingston and Southworth runs, a 350-passenger vessel is recommended.

Figure 2 also summarizes the results of a sensitivity analysis conducted on the peak-hour capacity estimation. The sensitivity analysis shows that peak-hour demand could be higher or lower than the baseline estimate. The procurement of the larger 350-passenger vessel provides a greater degree of confidence that the POF system could support healthy ridership growth in future years.

Figure 2
Peak Hour Demand and Vessel Size Requirements
(Based on 2005 ridership potential)



Source: Berk & Associates, 1993

Vessel Selection Recommendations

Based on ridership and travel demand estimates, operating conditions on Puget Sound, wake-wash requirements, and reliability and cost-effectiveness considerations, a 350-passenger, 30-knot catamaran with waterjet propulsion and both bow and side-loading capability is the recommended vessel for expanded POF service. A vessel with these parameters will accommodate anticipated demand on the 4 routes, while providing relatively rapid, reliable and efficient cross-Sound travel. Travel times to Seattle for each route at 30 knots are shown in Table 3 below.

Table 3
Travel Times to Seattle at 30 Knots

• Bremerton:	34 minutes
• Southworth:	28 minutes
• Kingston:	35 minutes
• Vashon:	26 minutes

Source: Art Anderson Associates, 1993

The recommended vessel design has several important advantages:

- ☐ Utilization of a catamaran design will provide for relative rider comfort on the water, and will reduce the risk of wake-wash damage.
- ☐ Internal waterjet propulsion systems are well suited to sailing conditions on Puget Sound, and will reduce the likelihood of unscheduled maintenance (and service disruption) caused by contact with debris in the waters.
- ☐ A passenger-loading system using an over-the-bow ramp concept and retractable sliding doors will provide for rapid ingress and egress from the vessels, allowing 4-abreast loading and unloading. This system -- which is in use in several European countries -- will effectively triple or quadruple the current passenger egress rate, and minimize bottlenecks in the passenger flow. The boats will also have side-loading capability, for bicycle loading and as a back-up.

Proven Technology Requirements

Washington state law (RCW 47.60.651) restricts the state to the purchase of vessels "of a proven and operational design ... [that have been] placed in operation within the previous five years." This language, if strictly interpreted, could preclude the procurement of vessels that combine the technologies of low wake-wash, speed and reliability that are needed in Puget Sound ferry service. Since most of the technology has been developed abroad, a U.S. shipyard could not comply with both the letter of this law and the requirements of this plan without a compromise that could jeopardize the integrity of the program. Therefore, it is recommended that the state amend this statute to read as follows:

47.60.561 Passenger-only ferry purchase - Notice of intent to purchase. Whenever the department is authorized to purchase one or more new passenger-only ferry vessels using proven and operational technology pursuant to this section, it shall publish a notice of its intent once a week for at least two consecutive weeks in at least one trade paper and one other paper, both of general circulation in the state. The department shall mail the notice to any firm known to the department to have the experience and capability to construct USCG certified passenger carrying ferries of the size and with the performance required by the department.

Procurement Issues

It is anticipated that procurement of the POF vessels will be very competitive. Numerous shipyards across the country have already expressed interest in the project, and it is expected that at least several responses will be received when the project is put to bid. Because there are shipyards in Washington capable of constructing the vessel types recommended in this plan, if the state establishes a "Build Them in Washington" policy for vessel procurement, this requirement can be met. Although such a policy may be in violation of federal procurement guidelines, its impact on the state's ability to obtain federal funding may not be significant, since the (limited) federal funding available can be applied toward terminal and facility construction.

Useful Life of the Vessels

The recommended vessels have an estimated 15-year useful life. It is assumed that after 15 years of service, they would undergo a major overhaul, which would carry a significant cost and extend their use for an additional period. During the overhaul period, replacement vessels may need to be available to provide uninterrupted service.

Service and Fleet Plan Recommendations

As discussed above, the primary objective of the recommended new POF program is to provide consistently reliable and frequent service. Optimally, this translates into service frequencies of 30 minutes during peak periods on all routes. Although providing service at this level is the medium to long-term goal, in the short-term 30-minute service frequencies are neither justified by ridership demand, nor feasible given terminal constraints in Seattle.

Thus, it is recommended that POF vessel acquisition, service planning and terminal improvements be implemented in 2 phases -- an initial core program and a Phase II expansion. This phasing plan will allow for the implementation of expanded service within a relatively short planning horizon (3 years), while providing flexibility regarding the timing of the second phase. Table 4 shows the peak and off-peak service frequencies for each route in Phases I and II.

Table 4
Service Frequencies by Route

	Phase I: 8 Boat Fleet		Phase II: 5 New Boats	
	Service Frequency		Service Frequency	
	Peak	Off-Peak	Peak	Off-Peak
Kingston	45	90	30	60
Southworth	45	90	30	60
Bremerton	90	90	30	60
Vashon	90	90	40	60

Source: Art Anderson Associates, 1993

Recommended Core Program: 8 Boats -- 7 New and 1 Existing

The recommended core program features a total of 8 vessels; purchase of 7 identical new boats, and retention of the Tyee. This core program will provide peak-period service frequencies of 45 minutes on the Kingston and Southworth routes (the 2 routes without auto ferry service to Seattle), and 90 minute service on the Bremerton and Vashon routes. The recommended route distribution of the 8 boats is shown in table 5 below.

Table 5
Recommended Core Program: Vessel-Route Distribution

- | | |
|------------------|---|
| • New Boats: | 1 Bremerton/2 Southworth/2 Kingston/1 Vashon
1 maintenance rotation boat |
| • Existing Boat: | Retain Tyee as emergency backup vessel |

Source: Art Anderson Associates, Berk & Associates, 1993

As the table shows, the core program would provide for 1 new boat to serve as a maintenance rotation vessel during the 2 weeks per year each vessel is undergoing scheduled maintenance. The Tyee would move from its current Vashon route to serve as an emergency back-up vessel to be used when more than 1 boat is out of service. (This would occur when one boat is in scheduled maintenance and another requires unscheduled maintenance.) This maintenance

rotation and back-up capability will enhance the likelihood of obtaining consistently reliable service.

Phase II: 5 Additional Boats Provide Increased Capacity and Service Frequency

Implementation of Phase II accomplishes 2 goals: it provides improved service frequencies on all routes; and it satisfies estimated future demand for increased capacity on the Kingston and Southworth routes. As shown in table 4, with the implementation of Phase II all routes will be receiving fairly comparable service and service frequency. This service increase is estimated to be most important for the Kingston and Southworth routes, the routes which the ridership analysis indicates will reach capacity early in the next decade (between 2000-2005).

To meet the demand for additional service on these 2 routes, and a systemwide service level of 30-minute service frequencies, it is recommended that 5 additional vessels be purchased in Phase II. The route distribution of the total POF system in phase II is shown in Table 6 below.

Table 6
Phase II Vessel-Route Distribution

-
- 3 Bremerton/3 Southworth/3 Kingston/2 Vashon
1 maintenance rotation boat
 - Retain Tyee as emergency back-up vessel
-

Source: Art Anderson Associates, Berk & Associates, 1993

Timing and Constraints on Phase II Implementation

The timing of Phase II implementation will be a function of rider demand and terminal permitting and construction schedules. As mentioned above, the ridership analysis indicates that customer demand may exceed available capacity on the Kingston and Southworth routes around 2002. However, this is a planning estimate -- actual demand will be a function of the marketplace, and thus will be driven by factors such as the economy, the location of job growth, comparable housing prices, and the level of highway traffic congestion. Once POF service is initiated on these routes, it will become clearer whether additional service is needed on a faster or slower timetable.

Colman Dock Constraints. Another critical factor governing the timing of Phase II implementation is the expansion of Colman Dock. In order to accommodate the volume of vessel traffic associated with a 13-boat program, the passenger-only facilities at Colman Dock will need to be expanded. As discussed in the terminal section below, this expansion involves the construction of 3 bow-loading slips at the southern end of the facility, and expanded passenger waiting and ticketing areas. It is estimated that environmental review, permitting and construction of these improvements will take a minimum of 7 years (5 years for environmental review and permitting; 2 years for construction), assuming that there is no litigation and the process proceeds smoothly. Delays in starting this project, or at any stage along the way, will result in a delay in the state's ability to expand the POF program into Phase II.

Disposition of the Current POF Fleet: Retention of the Tyee and Sale of the Skagit and Kalama Monohulls

The Tyee. As discussed above, it is recommended that the Tyee be retained and employed as an emergency back-up vessel. It is also recommended that the Tyee's utility and performance be monitored over the course of Phase I. Retrofitting the Tyee to accommodate bow-loading may be useful, although it is not recommended at present and the cost of such a retrofit is not included in POF program cost estimates.

In planning for Phase II, it is recommended that overhauling or replacing the Tyee be evaluated. Because of the uncertainty surrounding the future use of the vessel -- how much time the boat will actually be in service -- no specific recommendations are made here regarding the Phase II disposition of the Tyee. However, by the time of Phase II (2002 or beyond), the Tyee will have had about 15 years of service, and such an evaluation will be prudent.

Skagit and Kalama. As part of the core program development, it is also recommended that the Skagit and Kalama vessels be sold, and that these revenues be applied toward purchase of a new vessel. The Skagit and Kalama have several important operating deficiencies: their monohull design provides a relatively uncomfortable ride for passengers and requires that they be operated at slower than optimal speeds to reduce the risk of wake damage; they are maintenance-intensive; and their reliability is suboptimal. From a fleet perspective, they cannot substitute for

the new recommended vessels since their capacity (250 passengers) is smaller and their operating speed (20 knots) is slower. Using either vessel as back-up replacement boats would result in degraded service and would fail the test of the proposed new program -- consistently reliable service.

Boat brokers indicate that if the vessels were put up for sale in 1994, they could be expected to sell for about \$1.0 million each. The vessels, which were built as ferries on a crew boat hull design, would nonetheless likely sell on the ferry market, which has higher returns than the crew boat market. The sales price obtained by the state is likely to depend in significant part on the degree of urgency attached to the sale. For revenue estimation purposes, a total sales price of \$2.0 million is assumed, and is factored into the capital financial analysis.

Staffing Recommendations

A key element in the success of the recommended POF program is adequate staffing and organization. Specifically, it is recommended that the Marine Division (or another agency if the program is not operated by the Division) establish a separate passenger-only unit within the larger organization. This unit should be headed by a program manager (port captain) with overall responsibility for POF maintenance and operations. Further, maintenance and operations staff should be dedicated full-time to the smaller passenger vessels. Maintenance mechanics within the POF unit should only work on passenger vessels. They should not switch back and forth between passenger and auto ferries. Likewise, operating staff should be dedicated to the passenger vessels.

This staffing approach will provide for efficiencies in service delivery. A possible administrative and maintenance staffing structure for the recommended core program is shown in Table 7 below. This staffing level (8 maintenance engineers) is based in part on WSF's current labor agreement, which calls for one engineer for each POF vessel. However, WSF maintenance staff have indicated that an expanded POF program could require as many as 16 engineers, plus additional terminal management staff, terminal attendants, and additional clerical support. Therefore, the staffing levels in this report should be considered preliminary. It is recommended that a detailed maintenance and operations plan be developed to satisfy the operating requirements of the program, and the labor agreement be amended to reflect program needs.

Table 7
Preliminary Phase I Passenger-Only Program and Maintenance Staffing

• Port captain -- Program Manager
• 1 Port engineer
• 2 Chief engineers
• 4 Engineers -- night
• 2 Engineers -- day
• 2 Engineers --- lay-up facilities (Kingston and Southworth)

Source: Art Anderson Associates, 1993

Transit Connections

Another element critical to the success of the recommended program is good transit connections on both sides of Puget Sound. An effective ferry-transit interface is necessary for true passenger mobility, and to encourage people to switch from auto to passenger mode. The Transportation

Commission, in its December 16, 1993 action on the POF program, signaled the importance its members place on transit connectivity and integrated transit service planning, and indicated that the Commission will be paying close attention to these issues in the future.

Presently, there are several encouraging indicators of effective transit-ferry planning and service provision. On the west side, Kitsap Transit is working toward improved ferry connections and ferry-related service, and WSF is developing terminal facilities to support such transit interconnection. In Seattle, WSDOT and the Transportation Commission have initiated a project to identify transit opportunities and connections from the waterfront to the central business district. The objective of the project is to increase passenger mobility in the area by coordinating design, transportation planning and transit service elements.

Recommended Terminal Improvements

Although there is a tendency to focus on the vessel-related aspects of passenger ferry service, terminal design and capacity issues are equally important in ensuring a successful program. The following section presents a brief overview of vessel docking and passenger handling recommendations for Seattle and each of the west side terminals. It also presents summary information on permit requirements and estimated construction costs for each facility.

Docking and Passenger Access Recommendations Common to all Terminals

The proposed docking facility for all terminals is identical -- a floating slip as depicted in Figure 3. Although the proposed design for each terminal will vary, there are basic features common to all facilities: the passenger access areas will have safety railings and, if desired by the community, a canopy for weather protection; there will be a minimum of a 4-foot wide transfer span opposite the stern door to permit bicycles to load and unload without conflicting with pedestrians; and all terminal and loading facilities will be accessible to mobility-impaired persons and in compliance with Americans with Disabilities Act (ADA) requirements.

Figure 3
Bow-Loading Slip Design

Source: Art Anderson Associates

It is expected that the present round-trip ticketing policy would be retained, with all ticket sales occurring in Seattle. A system similar to that used for walk-on passengers on the car ferry would be workable, except that automated ticket vending is proposed; this may reduce future operating cost increases. A vending system similar to that used by the Bay Area Rapid Transit District (BART) in San Francisco would allow the sale of single-trip or multiple-trip tickets. Ticket vending machines could be located in an outer lobby. Turnstiles would admit passengers to the waiting area, and station agents would assist people unfamiliar with the system. The possibility of providing a common ticketing facility at a single point for all walk-on passengers in Seattle should also be considered. The capital cost of such a system is not included in the overall POF program cost, and there are many finance and coordination issues associated with its implementation. It is recommended that WSF staff identify planning and operational issues relevant to automated ticketing, and that the matter be analyzed by the Tariff Policy Committee within the overall context of WSF ticketing practices and policies.

The following section briefly describes the key features and improvements planned for each terminal.

Seattle Terminal: Colman Dock

Because all the POF routes are destined for Colman Dock, the ability of this facility to handle vessel traffic and passengers is critical to the success and even the feasibility of an expanded POF program. There are several important issues associated with Colman Dock's current and planned capacity, each of which will be described below.

Currently, passenger-only service is served by a temporary terminal at Pier 50 consisting of a steel barge which accommodates 2 side-loading ferries, 2 gangways and a tent for ticketing passengers. For a number of years, WSF has been planning a new and expanded passenger ferry terminal. The proposed new facility encompasses a 7,900 square foot terminal building located north of the present facility, elevator and escalator access to the present second-level terminal building, 2 boarding floats with berths for up to 3 side-loading vessels (the present fleet), an access gangway, and a mobility-impaired drop-off loop.

This facility was planned well before the current study, and therefore did not contemplate a POF fleet of 8 or 13 vessels. The project has received a shoreline development permit from the City of Seattle, but is now stalled pending receipt of water quality certification from the Department of Ecology (DOE) and a permit from the Corps of Engineers, which is predicated upon DOE certification. At issue is the question of how to deal with cleanup of contaminated bottom sediment that was disturbed when the old north slip was removed.

Phasing the Recommended Improvements. In order to accommodate an expanded POF program of 4 routes, Colman Dock optimally needs 5 POF slips -- one dedicated for each route and a fifth slip to accommodate the maintenance reserve vessel, to provide capacity for unexpected maintenance problems, and to facilitate vessel switching and lay-ups. However, the current shorelines permit (which takes 1-2 years to obtain) allows only 2 slips on the north side of the terminal, and requires that the temporary terminal now in use at Pier 50 be removed upon completion of the new facility. Significantly expanding the terminal facilities is expected to take a minimum of 5 years for environmental review and permitting (2-3 years for completion of a new environmental impact statement and 1-2 years to obtain a new shoreline permit), and about 2 years for construction. These timelines could be lengthened if there is substantial opposition to the project, or a lawsuit is filed.

Given these considerable constraints, recommended improvements to Colman Dock to accommodate the expanded POF program are contemplated in 2 phases. In the first phase, the

already-permitted north terminal project would be modified to accommodate 2 bow-loading vessels, and an additional gangway would be added to allow boarding passengers to proceed directly to the float when their boat is ready for boarding. In addition, a new shoreline permit should be obtained, which would allow the existing south float to remain. This float could accommodate vessels from the Vashon and Bremerton routes, while the northern dock would handle the Kingston and Southworth routes.

The importance of obtaining a shoreline permit which allows retention of the south float cannot be overstated. Without that facility, the options are either to reduce the number of routes coming into Colman Dock by utilizing triangular Vashon-Southworth-Seattle service, or for all 4 routes to use the 2 northern slips. The first option would be unacceptable to Vashon and Southworth riders, and the second option is problematic and unacceptable to WSF staff. Staff note that proceeding with planning for the expanded POF program while relying on only 2 slips to accommodate the vessel traffic is analogous to operating a service plan without enough vessels -- it is tantamount to designing a system which will be unreliable.

Given the project's criterion to "design for success," every effort should be made to obtain a new shoreline permit as quickly as possible. Because this task is expected to take a minimum of one year to accomplish, the state should initiate this effort immediately. Initial planning and environmental review for the Phase II expansion should also begin as quickly as is reasonable.

The cost estimate for Phase I improvements to Colman Dock is \$8.9 million. This estimate includes the cost of the proposed building, connections to the upper level terminal, gangways, slips and moorage. It does not include the rectangular float which has already been constructed. Construction of the improvements is expected to take 2 years.

Phase II Improvements. In Phase II, 3 new bow-loading slips with access gangways are proposed to be constructed in the south terminal area, replacing the existing float. This additional capacity will provide docking facilities to adequately accommodate both the recommended core fleet and the phase II expansion. It provides enough slips to allow schedules to be maintained even in the event of weather problems or unscheduled maintenance requirements on a particular vessel.

In addition to new slip construction, recommended phase II improvements include the construction of terminal waiting space over the car-holding area, connected to the present terminal so that entering passengers can go from there to the north POF waiting area, west to the Bainbridge and Bremerton auto ferries, or to the south POF waiting area. Another overhead walkway from the south POF terminal to the north side of Columbia and onto First Avenue is also planned to augment the existing 9-foot wide overhead walk along Marion Street. This project is estimated to cost \$22.4 million, and to take 2 years to construct. It should be noted that these improvements are only a proposal, and that all alternatives will be identified and fully analyzed in the environmental review process.

Lay-up Facilities. Currently, the state services and maintains the existing 3-vessel POF fleet at a lay-up facility located at Pier 46. WSF is subleasing this space, which is owned by the Port of Seattle, from Foss Tug through April 1994. The Foss lease with the Port terminates in August 1997, however, Foss has recently indicated a desire to terminate its lease with the Port, and to do so as soon as possible. The Company is talking with a number of firms interested in leasing all or a part of the facility. If Foss leases the entire facility to a firm, WSF will lose its lay-up area in the spring of 1994. This is problematic, not only for current POF operations, but for the future program expansion. The recommended terminal design for Colman Dock assumes the use of Pier 46 for lay-up activities.

Moorage space along the waterfront is a scarce commodity. Given its location adjacent to Colman Dock, it would appear that Pier 46 is the preferred location for POF maintenance activities in Seattle. The full facility which Foss is seeking to sublease includes: 640 feet of moorage; a 31,650 square foot pier apron; an upland parking area of 12,000 square feet; and a building containing approximately 3,000 square feet of office space and 10,000 square feet of warehouse and shop space. The cost of leasing these facilities, and the terms and conditions of such a lease are presently unknown. WSF staff are currently pursuing resolution of this issue.

The importance of a functional and convenient maintenance area for the expanded POF fleet cannot be overstated. Therefore, it is strongly recommended that WSF obtain the use of the full Pier 46 facility, in order to service the expanded fleet anticipated for 1997.

Kingston Terminal

Currently there is no enclosed, heated terminal in Kingston. A new 3,000 square foot terminal will be built to handle both Edmonds walk-on passengers as well as Seattle-bound riders. The vessel mooring float will be approximately 570 feet from the proposed building, requiring just over a 3-minute walk (at a normal walking pace of 3 feet per second).

Kitsap County has already granted a shoreline development permit for a design similar to that proposed in this report. Still to be obtained is a Corps of Engineers permit, which is tied to hydraulic project approval by the state Department of Fisheries and water quality certification by the Department of Ecology. Obtaining these approvals and certifications and the Corps permit is estimated to take about 90 days. A building permit will also be required to be issued by the County; this permit is expected to take about 60 days.

Terminal and facility construction is estimated to cost a total of \$5.2 million, and to take about 15 months to complete. This cost estimate does not include planned improvements for bus and car drop-off zones and realignment of the auto holding area.

Southworth Terminal

The Southworth terminal currently has one auto slip and a small terminal building. The old wooden pier will probably need to be replaced within 10-15 years. Since the terminal building is both located on an old pier and is too small, it is recommended that it be replaced with a new 3,000 square foot building supported in the same location by a concrete pier. As with the Kingston terminal, a shoreline development permit has been issued by Kitsap County for a passenger-only terminal similar to that recommended here. As with Kingston, the Corps of Engineers permit -- encompassing Fisheries and Ecology approvals -- needs to be obtained, as well as a County building permit for a new terminal building. The estimated time to obtain these permits is the same as for Kingston. Terminal and facility construction would take 15 months and cost an estimated \$5.9 million.

Bremerton Terminal

The passenger-only ferry serving Bremerton currently ties up on the Port of Bremerton's recreational breakwater adjacent to where the Port Orchard ferries dock. To convert the present passenger ferry berth to a bow-loading facility will require certain modifications, including placement of a new 25-foot wide head float at the end of the gangway and attached to the existing float. The present boarding platform will be widened to accommodate bicycles and side-loading vessels. An overhead walkway will connect the head float with the platform at the end of the

gangway. A canopy will be provided for the gangway, overhead walk and head float. Construction of these modifications will need to be programmed to not disrupt current ferry services; to integrate with the City of Bremerton's covered walkway construction project; and to coordinate with Kitsap Transit service planning.

No permits have yet been applied for to allow these improvements. Both Kitsap County and the Port of Bremerton, which owns the breakwater will require approvals. It is estimated that it will require 3-6 months for the City of Bremerton to issue a shoreline permit, and another 3 months to obtain Corps of Engineers/Fisheries/Ecology approvals. Construction is expected to take approximately 9 months. Estimated costs are \$1.3 million.

Vashon Terminal

The recommended Phase I Colman Dock configuration calls for retention of the existing side-loading float on the south side of the facility, to be used for the Vashon and Southworth routes. Given the need to use this side-loading facility at Colman Dock, no Phase I facility changes are needed or recommended for Vashon. When Colman Dock's Phase II expansion is complete, the side-loading float will be replaced with new bow-loading slips. This will require the Vashon loading facility to be replaced with a new float to accommodate bow-loading. The passenger terminal will not require modification.

All the permit approvals discussed above (except a building permit) will be required for the Phase II improvements. The cost of the project is estimated at \$2.9 million. Gaining regulatory approvals is estimated to take 9 months, and construction is expected to take another 9 months.

Project Schedule

Figure 4 presents a preliminary program implementation schedule showing the time required to plan, permit and construct the various recommended terminal improvements, and the timing associated with vessel procurement, construction and delivery. As the schedule shows, vessel procurement and construction -- which is estimated to take approximately 2 years -- is not the key constraint to initiating new POF service. Rather, the binding constraint on the program is the Phase I improvement of Colman Dock. Resolving permitting issues associated with the reconfigured facility, resolving the current environmental issues and constructing the proposed improvements is estimated to take about 3 years -- or until early 1997. This means that the earliest the new service could begin would be in 1997. Any delay in the Colman Dock project will delay the initiation of a new POF program.

Figure 4
Passenger-Only Program Timeline

Source: Berk & Associates, 1993

Schedule Impacts of Phase II Colman Dock Improvements

Just as completion of Colman Dock's Phase I improvements drive the schedule for Phase I of an expanded POF program, likewise completion of Phase II Seattle facility improvements controls the ability to expand the passenger fleet beyond the core program.

As the program schedule shows, gaining environmental and regulatory approvals for Phase II is expected to take 5 years (best case -- assuming no litigation), and construction will take another 2 years. Assuming that the project begins in 1996, it should be completed 7 years hence, or in 2002. Coincidentally, this is the year that the ridership analysis shows additional vessel capacity may be needed. So, if Colman Dock Phase II moves apace, there will be no facility constraints to adding new vessel capacity. If, however, Colman Dock cannot be expanded on this timetable, the ability to add capacity to meet passenger service demands will be constrained by capacity at Colman Dock.

Financial Analysis

Capital Cost Estimates

Table 8 presents estimated capital costs (in 1993 dollars) for the recommended program -- Phases I and II. As the table shows, the total capital requirement for Phase I is estimated at \$60.5 million. This estimate includes terminal improvements of \$22.1 million, of which \$9.0 million is attributable to Colman Dock; maintenance facility improvements of \$4.8 million, including \$3.5 million for expanded heavy maintenance functions at Eagle Harbor; and vessel costs of \$34.3 million, including design, construction management and contingency, procurement and spare engines and parts. This total vessel cost translates to a per-boat cost of about \$4.9 million, which reflects the volume discount and economies of scale associated with a 7-boat procurement.

Table 8
Total Capital Cost Summary
(Millions of 1993\$)

	Phase I	Phase II
Capital Requirements	8 boats	5 boats
Terminal improvements:		
Seattle Phase I	\$9.0	\$0.0
Seattle Phase II	\$0.0	\$22.4
Kingston	\$5.2	\$0.0
Southworth	\$5.9	\$0.0
Bremerton additions	\$1.3	\$0.0
Vashon additions	\$0.0	\$2.9
Total terminal improvements	\$21.4	\$25.3
Expanded Eagle Harbor	\$3.5	\$0.0
Maintenance barge	\$1.3	\$0.0
Total maintenance improvements	\$4.8	\$0.0
Total vessel costs	\$34.3	\$25.4
Total capital requirement	\$60.5	\$50.7

Source: Art Anderson Associates, 1993

Phase II cost estimates are also presented in Table 8. As the table shows, total Phase II costs are \$50.7 million. This estimate comprises Colman Dock improvements (\$22.4 million); redesign and construction at the Vashon terminal to accommodate bow-loading (\$2.9 million); and \$25.4 million for purchase of 5 additional vessels.

Phase II cost estimates are provided to present a comprehensive assessment of recommended POF system needs. Although these estimates are necessarily presented in 1993 dollars, actual construction and acquisition costs are not expected to be incurred until sometime in the next decade, most likely in the 2000-2005 time period. Consequently, actual expenditures at that time will be higher due to inflation.

Capital Financing Requirements

Table 9 summarizes the capital financing requirements for implementation of the recommended program. The table shows that the WSF capital budget already includes \$19.6 million (in 1993 dollars) of programmed funds from state and federal sources for terminal improvements at Colman Dock, Kingston and Southworth. Given a total facility capital requirement of \$26.2 million and WSF programmed improvements of \$19.6 million, the total net unfunded capital facility requirement is \$6.6 million.

Table 9
Capital Financing Requirements Summary
(Millions of 1993\$)

Capital Requirements	Phase I 8 boats	Phase II 5 boats
Total facility costs	\$26.2	\$25.3
Less programmed improvements	(\$19.6)	\$0.0
Net facility costs	\$6.6	\$25.3
 Total vessel costs	 \$34.3	 \$25.4
Less revenue from sale of monohulls	(\$2.0)	\$0.0
Net vessel costs	\$32.3	\$25.4
 Total net capital requirement	 \$38.9	 \$50.7

Source: WSF, Berk & Associates, 1993

The cost of 7 new POF vessels is estimated at \$34.3 million. Revenue from the expected sale of the Skagit and Kalama monohull vessels is estimated at \$2.0 million, for a net vessel capital requirement of \$32.3 million. This revenue offset assumes that the Federal Transit Authority's recently-adopted "like-kind" purchase policy would apply to the sale of the vessels: revenue from the sale could be applied towards the purchase of new POF vessels rather than being rebated to the federal government. Given this assumption, net vessel and terminal capital requirements are \$38.9 million.

Annualized Capital Requirements

Capital requirements can be funded in 2 ways: pay-as-you-go or debt financing. The pay-as-you-go approach requires that funds be accumulated over time, and facilities built as funding allows. Debt financing allows for front-loading of capital expenditures, so that facility improvements and acquisitions can be made earlier, with payments for these expenditures stretched over time. Historically, the Ferry System has used both approaches. For example, the Jumbo Mark II program is funded through debt issuance, while terminal improvements have traditionally been funded on a pay-as-you-go approach, supplemented with available federal funds.

Given the significant capital requirements for the recommended POF program and the immediacy of the need, the use of debt financing for the project is assumed in this analysis. Table 10 shows that a total annual debt service payment of \$3.7 million is required. A key assumption is that since vessels and terminals have different useful lives, they would be financed separately. The vessels have a useful life of 15 years (at which time they could be overhauled, refurbished and continued in service), so a 15-year debt financing term is assumed. Terminal facilities have a longer useful life, and so 25-year financing is assumed.

Table 10
Annualized Capital Requirements
(Millions of 1993\$)

	Phase I	Phase II
Facility requirements	8 boats	5 boats
Net facility costs	\$6.6	\$25.3
Debt issuance costs	\$0.1	\$0.4
Amount financed through sale of bonds	\$6.7	\$25.7
Annual debt service (25yrs @ 5%)	\$0.5	\$1.8
Vessel requirements		
Net vessel costs	\$32.3	\$25.4
Debt issuance costs	\$0.5	\$0.4
Amount financed through sale of bonds	\$32.8	\$25.7
Annual debt service (15yrs @ 5%)	\$3.2	\$2.5
Total annual debt service	\$3.7	\$4.3

Source: Berk & Associates, 1993

Preliminary Operating Cost Estimates

Table 11 shows annual estimated operating costs for Phase I and II of the recommended program. Total operating costs for Phase I are estimated at \$15.7 million per year (in 1993 dollars). This estimate includes the costs of operating and maintaining the terminals and vessels, and administering a separate POF unit within the Marine Division. It does not include another \$1 million in labor costs to provide increased maintenance and terminal staffing, as suggested by WSF staff. Because it is anticipated that specific operating and maintenance needs will evolve as the expanded POF program is further developed, and with the preparation of a detailed O& M plan, these cost estimates must necessarily be considered preliminary.

As Table 11 shows, total estimated operating requirements are offset by \$4 million in funds currently allocated to the existing POF program, for a total net new POF operating requirement of \$11.7 million per year.

Table 11
Preliminary Annual POF Program Operating Requirements
(Millions of 1993\$)

	Phase I	Phase II
	8 boats	5 boats
Annual operating revenue need	\$15.7	\$12.4
Less current POF funds	(\$4.0)	\$0.0
Net new revenue requirement	\$11.7	\$12.4

Source: WSF, Berk & Associates, 1993

Options for Funding the Operating Requirements

WSF does not have existing revenues to fund the \$11.7 million POF operating requirement. Implementation of the recommended plan requires new revenues. These revenues could come from fares, traditional state ferry funding sources such as the gas tax and motor vehicle excise taxes (MVET), and from local option taxes, each of which are discussed below.

Impacts of Initiative 601. One factor which complicates the development of a plan for new POF revenues is the recent passage of Initiative 601. With the Initiative in place, revenue proposal development become more complex, and may not be fully understood for several months. One of the limitations of the new law is that all state tax and fee increases are capped at a level determined by the rate of inflation and population growth in the preceding 3 years. The State Office of Management and Budget has placed that cap at 7.18% for FY 1995, and will recalculate the cap annually. Additionally, any tax increase before July 1, 1995 must be approved by a vote of the people.

One key issue which has yet to be resolved is the limitation on tax increases for revenues deposited in the Transportation Fund. Since Initiative 601 limits General Fund expenditures, it is unclear what, if any, will be the impact of raising revenues which do not accrue to the General Fund. All WSF revenues originate in the Transportation Fund, implying that there may be more flexibility to fund a new program than would be the case for the General Fund. In any event, state revenues will be increasingly constrained under the new law, making the funding of any new state program more challenging.

User Funding. Table 12 shows projected farebox revenues under 2 scenarios: continuation of existing fare policies; and increasing POF fares to reflect the premium service provided. Farebox revenues for both scenarios are derived from estimates of the passenger-only market for the 4 POF routes. To be conservative in estimating both farebox revenues and the remaining operating shortfall, ridership estimates were discounted by 20%.

Under the existing fare policy alternative, the effective cross-Sound coupon-book rate of about \$1 per one-way ride would remain in effect. This would generate an estimated \$700,000 per year in revenues from new riders to the system, resulting in a net operating shortfall of \$10.9 million per year. Under the increased fare alternative, POF service would be categorized as premium service, and coupon-book fares would be increased to about \$2 per one-way trip. With adjustments for elasticity, this alternative would generate \$2.9 million per year in incremental farebox revenues, resulting in an annual operating shortfall of \$8.8 million.

The Transportation Commission, in its December 16, 1993 action approving an expanded POF program, indicated interest in premium pricing for the new service. The Commission's rationale for such a pricing approach is that the new service will truly be "premium" service, for which a premium price could be fairly charged. The Commission directed WSF's Tariff Policy Committee to analyze POF pricing levels, including premium pricing, and to make recommendations to the Commission on this issue.

Table 12
POF Operating Shortfall: Farebox and State Funding Needs
(Millions of 1993\$)

	Phase I	Phase II
	8 boats	5 boats
Alternative A: Existing coupon book fare		
(@ \$1 one-way)		
Fare revenues from new riders	\$0.7	\$1.0
Operating shortfall	\$10.9	\$11.4
<i>General fare increase required to:</i>		
Cover 100% of shortfall	22.0%	
Cover 60% of shortfall	13.0%	
Unfunded balance after 60% fare increase	\$4.4	per year
Alternative B: Double coupon book fare		
(@ \$2 one-way) "Premium fare for premium service"		
Net incremental fare revenues	\$2.9	\$1.4
Operating shortfall	\$8.8	\$11.0
<i>General fare increase required to:</i>		
Cover 100% of shortfall	17.5%	
Cover 60% of shortfall	10.5%	
Unfunded balance after 60% fare increase	\$3.5	per year

Source: WSF & Berk & Associates, 1993

In discussions with the legislator advisory committee, it was recommended that part of this operating shortfall be funded by an increase in across-the-board-ferry fares for all riders, with the remainder to be funded through additional state revenues.

Table 12 shows the level of general fare increase required to fund 100% and 60% of the shortfall under the two fare policy alternatives. The 60% target funding level is significant because it is the Transportation Commission's current policy that ferry riders pay 60% of the system's operating costs.

If the existing coupon-book fare is retained, covering 100% of the shortfall would require a 22% general fare increase; at the 60% level a 13% fare increase would be required. Under the premium pricing alternative, covering 100% of the shortfall requires a 17.5% general fare increase; at the 60% level a 10.5% increase is required.

As discussed above, under Initiative 601 fee increases will likely be capped at a rate equal to a calculated inflation and population growth factor. The impact of such a cap during a period of low inflation and moderate population growth is likely to be fare increases limited to single-digits. A farebox revenue increase of 10% or more will likely require more than one rate increase and a phased implementation plan. Given the complexity of these issues, the Transportation Commission has referred the matter to the Tariff Policy Committee for detailed analysis and recommendations.

Public Funding. Historically, WSF service has been funded by riders at or above the state's 60% operating cost recovery goal. The remaining 40% of operating expense has been funded by the state, from 3 revenue sources: the gas tax, MVET and motor vehicle license fees.

Local taxes, such as local option gas and sales taxes have historically not been a direct part of ferry system funding. (Indirectly however, Kitsap County opted to make a local tax contribution to support ferry operations when voters recently approved a .2% increase in the sales tax rate for Kitsap Transit. A significant portion of that increased transit funding will be earmarked for ferry-related mobility improvements, including park-and-ride lot development and improved transit-ferry service connections.)

As part of this study, local financing options to address a portion of the POF operating shortfall were identified, analyzed and presented to local and state policy makers. Use of such local funding options to finance a portion of POF operations met with little enthusiasm by either state or local officials. In general, there was little interest in changing the composition of traditional ferry funding sources. Rather, direction from the policy makers has been to assume the continuation of the 60%-40% funding split, and to develop a financing plan which funds POF program expansion through proportionally increased fare revenues and increased state revenues.

State Funding for the POF Program is Tied to a Transportation Revenue Package. The POF revenue analysis shows that, assuming adherence with the state's 60%-40% ferry financing policy, the state portion of the operating shortfall is in the range of \$3.5-\$4.4 million per year. This translates roughly into about a 1/8 of a cent increase in the gas tax, and would be in addition to the approximately 1/4 of a cent gas tax increase (or equivalent MVET increase) WSF needs to meet operating cost requirements later this decade. Obtaining these new monies will require additional taxing authority to be granted by the Legislature. A request for such additional revenues should therefore be part of an overall transportation revenue enhancement proposal submitted to the Legislature.

Governance Analysis

The purpose of this section is to review and evaluate options for the governance of an expanded passenger-only ferry (POF) program. Since the 1950's, auto ferry service in the Puget Sound area has been provided as part of the Marine Division of the Department of Transportation. As such, it is subject to the same governance structure as highway transportation: the Transportation Commission is the policy-setting body authorized to develop and guide all programs; the Legislature controls appropriations; and the Department owns and maintains all facilities and vessels, and operates the service. This structure was developed specifically to govern what was originally known as the Highway Department. Other modes of transportation, including most aviation, freight and passenger rail, and public transit have been governed separately.

Background: Framing the Question

The question this section poses is: what structure or approach best facilitates the financing, efficient operation and responsive governance of an expanded passenger-only ferry program? As a first step in addressing this question, interviews were conducted with representatives of a variety of public and private sector organizations, each with a somewhat different interest and with different positions. One conclusion from these conversations is that, while there are several

perspectives on the issue, there is no "right" answer. Many of the arguments on both sides (for maintaining the status quo and for changing it) are reasonable and have merit.

Another important conclusion is that while there is interest in theoretical and conceptual questions of POF governance (i.e. is a passenger ferry system a regional or a state service?; should such service be characterized as public transit or as part of the state highway system?) there is little interest in changing the status quo. The input received to date from the project's legislator advisory committee, the Transportation Commission, members of the Kitsap Regional Council, and other stakeholders indicates that there is no compelling reason to move away from the current system of governance and funding. The following section presents a summary of issues and interests identified.

Issues and Concerns of Stakeholders

Issue: The Nature of Highway and Marine Transportation. Some observers have asked the question: Are highway and marine transportation fundamentally similar such that one governance structure is appropriate to both? Of all the existing transportation modes, it is something of a historical accident that highway and marine transportation have become the primary responsibility of the state, while other modes are governed locally, regionally or by some combination of public-private authority. A significant distinction can be said to exist in the fundamental nature of highway and marine transportation.

Issue: Statewide versus Regional Transportation Systems. A major feature of the current governance structure is that both governing bodies are designed to serve statewide interests -- the Legislature and the Commission represent all parts of the state and both major political parties. This balance was clearly designed to prevent the concentration of resources and services to any one part of the state. With the highway system, this is necessary because the needs of densely populated urban areas and the needs of rural areas of the state need to be balanced. With the marine transportation system, however, some have argued, marine service is inherently not a statewide issue in the same way that highway facilities are, but rather a more localized Puget Sound issue.

Issue: The Nature of Auto Ferry and Passenger-Only Ferry Service. Does the nature of auto ferry and passenger-only ferry service warrant similar or different governance structures? Currently, Washington State Ferries is considered part of the state highway system. Auto ferries are viewed by many as appropriately part of the highway system because they are facilities for connecting communities with each other and with the roadway network. There are some, however, who argue that passenger-only ferry service is far more similar to the public transportation system than it is to the highway system. Public transit carries people rather than vehicles or goods and has as a key feature pedestrian-oriented facilities. Still others note that there is an important relationship between auto and passenger ferries; the existence of "foot ferries" frees up capacity on the auto ferries for freight and goods movement and for those who must take a car across the Sound.

Issue: System Integration and Coordination. Governance and operations decisions in all forms of transportation should be made from a network or systems perspective. In general, the goal is to provide riders with "seamless" transportation from mode to mode and from origin to destination. However, our current transportation system has not yet reached this goal. Instead, there is a layering of government agency efforts which is less than efficient. Coordination of transportation planning and service delivery is the objective; good governance means consolidating efforts towards this end.

Issue: Multimodalism as the New Hallmark of All Transportation.

Should travel over water be treated fundamentally differently than travel over roads? As we move into the era of multimodalism, the federal government (ISTEA), the state (GMA) and the region (Vision 2020) are developing policies and goals that require us to de-emphasize auto travel and strengthen the availability of other transportation options. Doing so implies an increasing inter-relatedness of all modes and makes distinctions between "statewide" and "regional" and "local" transportation less meaningful.

Issue: Development of a Marine PTBA or RTA. A marine PTBA or RTA has been suggested as one approach to POF governance. Such a structure would theoretically combine the benefits of state and local governance -- state money and increased local and regional control. A PTBA or RTA structure also implies significant local financial participation. However, there is no existing model for this organizational structure since the only existing RTA is a regional organization with very limited state participation in governance or funding.

Issue: Private Sector Involvement. Some have suggested that privatization or public-private partnerships could best meet POF service needs. Passenger ferry service is offered by a number of private companies here and elsewhere and efficiencies may be available through competition and the market place. The private sector's role could take several forms: purchase and leasing of vessels; system operation or maintenance; or public-private partnerships for system governance. These issues are discussed in greater detail below.

Considerations in Evaluating Alternative Governance Structures

In order to evaluate a range of alternative approaches to governing an expanded passenger-only program, it is important first to specify what features a desirable governance should have. From the discussions outlined above, the following 5 criteria have been distilled:

Financial Adequacy. The approach must ensure the adequate availability of revenue sources. While philosophical discussions of the nature of a service are interesting, a crucial test of any governance mechanism is its ability to generate the required funds and to ensure the reliability of the revenue stream over time.

Transportation System Integration. Close coordination with the existing auto ferry system and the transportation network as a whole is also key for a successful POF governance approach. POF vessels will be sharing WSF docking and terminal facilities with auto ferries, and optimally, POF passengers will enjoy seamless connections with transit or parking/drop-off facilities at one or both ends of their ferry ride. In some cases POF service is interchangeable with auto ferry service, and therefore POF schedules must be coordinated with WSF to ensure operational feasibility and appropriate service frequency.

Administrative Efficiency. Efficiency in administering program development and implementation is an important consideration in evaluating governance alternatives. Duplication of managerial and administrative functions is time-consuming, inefficient, expensive and in general, to be avoided.

Political Feasibility. Any proposed governance option must be acceptable to the stakeholders of the system. In this sense, stakeholders are ferry riders (customers) as well as anyone whose help is needed in paying for or operating the service. Assuming that state participation in funding will continue, the adopted governance alternative must be acceptable to

the Legislature. With any local funding option, local elected official and voter willingness to pay must be present. Finally, any agency required to assist in operating the system must be willing to cooperate, be it the DOT Marine Division, a local transit agency or a local jurisdiction with permitting authority.

Balancing Stakeholder Interests. Ferry riders from all communities and all categories of ridership as well as the citizens of the region must feel their interests are being considered and met to the fullest extent possible. Commuters and infrequent riders, tourists and area residents, neighborhoods affected by ferry traffic or ferry-related business, all have a stake in how an expanded POF program might be governed. If any group feels it will not benefit, or even be harmed by an approach, it will be difficult to implement a successful program.

These 5 considerations are applied in the next section to a range of possible approaches to governing a passenger-only system.

Governance Alternatives

Three broad governance alternatives are considered: (1) state governance, (2) local or regional governance, and (3) a hybrid of the two. Within Alternatives 1 and 2 there are several sub-options. Additionally, a discussion of the potential for privately operated passenger-only ferry service follows.

Alternative 1A: State Governance - Current Model

The current state governance balances the interests of various transportation modes and regions within the state, and allows for good integration between auto and passenger ferry routes. Coordination with local jurisdictions and transit agencies also works reasonably well. Funding is now provided by gas tax and motor vehicle excise (MVET) revenues, fees and the farebox. However, some perceive the current form of governance to be less than fully responsive to the particular interests of Puget Sound area constituents and the needs of Ferry System riders. Constituents and riders sometimes wish they had someone or some organization more directly responsible for service to hold accountable for meeting their needs.

Alternative 1B: State Governance - New Advisory Board to the Commission

This alternative would leave the Transportation Commission in its current form but would create a strong Passenger-Only Advisory Board to represent this constituency. The Advisory Board would be comprised of local elected officials and citizens. While retaining most of the current governance structure, this alternative would provide a means to increase the Ferry System's and the Commission's accountability and responsiveness to the citizens and commuters of the Puget Sound area and it could provide a forum for coordination of state and local issues.

Alternative 2A: Local or Regional Governance - Single County PTBA

Passenger-only service could be incorporated into one of the existing PTBAs (e.g. Kitsap Transit or King County Metro), with the existing governing body comprised of local elected officials serving as the policy making authority. This alternative would provide limited input for citizens residing outside the PTBA boundaries (i.e. ferry users in the Olympic Peninsula, and south Puget Sound communities) and would thus be limited in its ability to balance all interests. Efficiencies of operating within existing experienced transit agencies could be a plus as far as administrative

efficiency is concerned, although the expertise in marine transportation that now resides in the DOT would probably need to be recreated by the local agency.

A major drawback to the single-county PTBA is that under current statutes, it would not allow for state involvement in funding. This means that the agency would, as currently configured, be required to fund operations and capital acquisitions entirely through local funding. This is problematic because Metro is at its statutorily authorized sales tax maximum of 0.6%, and Kitsap Transit is near its maximum and would be unable to generate sufficient local funds to operate the expanded POF service.

Alternative 2B: Local or Regional Governance - Existing RTA or New Passenger-Only RTA

Passenger-only ferries could be added to the RTA by amending the existing statute, however, this option represents a significant problem, since Kitsap County (perhaps the most affected ferry community) is not a part of the RTA. Alternatively, a new regional authority, modeled after the existing RTA could be formed. This new entity, a "marine RTA," would be dedicated to providing POF service and could incorporate the four Puget Sound counties: King, Kitsap, Pierce, and Snohomish.

Under this alternative, local elected officials from each of these counties would serve on an independent governing board and would have the authority to ask voters for a local sales tax. Matching funds from the state would be appropriated by the Legislature. An important question mark with this alternative would be the political feasibility, as voter approval in 4 counties would be needed to authorize funding. As with the single-county PTBA option, a major drawback to this alternative involves the limited state role and the lack of access to state funding. This would limit the ability of the RTA to integrate its efforts seamlessly with the state's Transportation Commission and the Ferry System. While some operational efficiencies would be possible with the existing RTA, under the option of a new marine RTA, an entirely new management and administrative structure would have to be created, creating duplication with the DOT's Marine Division.

Alternative 3: Hybrid State/Regional Governance - RTA with Expanded State Role

This alternative would be partially based on the existing RTA structure. However, it attempts to remedy the problems associated with the limited state role identified in Alternative 2B and adapt the existing RTA structure for a POF governance system. The modified RTA contemplated under this alternative would provide for a significant state role -- about one-third of the Board seats -- as well as significant state funding. Such funding could be modeled in part on Governor Lowry's 1993 transportation funding proposal, which would have provided one-third of RTA revenues from a sales tax on gasoline.

In concept, this alternative has a great deal of appeal. It could be seen as providing the best of all worlds -- state funding and representation, thus balancing a broad range of interests, and increased local control, accountability and funding. What is unclear is how politically feasible such an option would be, and how important transitional issues associated with service provision, capital planning and program design would be handled. While Kitsap County voters may be willing to support funding for such a marine RTA, it is unclear whether the voters of Snohomish, King and Pierce Counties would perceive a benefit unless the proposal were incorporated with transit and rail service.

Private Sector Involvement in Passenger-Only Ferry Service - Background

Much of the interest and emphasis on "privatizing" or "competitively contracting" for passenger-only ferry service can be attributed to the POF program's similarity to transit operations, and a federal policy statement issued in 1984 on private enterprise participation. Because federal funds were used in the State's POF program, the WSF was subject to UMTA (now the Federal Transit Administration) regulatory guidance.

In the 1980's, the Reagan and Bush administrations emphasized private enterprise participation under several federally-funded programs. At USDOT, the Urban Mass Transportation Administration encouraged private enterprises to look for opportunities to participate in providing public transportation services, and local and state agencies were directed to establish private enterprise programs. These federal initiatives inspired the private sector to approach public agencies in search of service contracting opportunities. In some localities, successful contract arrangements were established.

Under the Clinton administration, these policies are shifting. In the November 1993 Federal Register, FTA issued a Notice of Proposed Recision of Private Enterprise Participation Guidance. The federal policy direction proposes to rescind this policy emphasis area and FTA announced its "neutrality" on the subject of private enterprise participation.

Potential for Privately Operated Passenger-Only Ferry Service

Public-Private Partnerships: Public and Private Benefit. The basis of an effective public-private partnership is mutual benefit. To have a workable public-private partnership, there must be a readily identifiable public benefit, and an obvious private benefit. In the case of passenger ferries, the public benefit could be provided in two ways: a private entity could acquire a fleet of vessels and operate commuter ferry service with an operating subsidy from the state; or the entity could lease vessels from the state and provide unsubsidized service.

In the former case, the state benefit would derive from saving the capital costs of vessel purchase; in the latter case the state benefit would be the savings on operating subsidies. The private sector benefit from such a partnership is straightforward -- a reasonable return on investment. However, obtaining such a return on passenger ferry investments in Washington has proved to be challenging. Difficulties confronting private firms seeking to provide passenger-only ferry service in or around the Puget Sound area include: low cost recovery on passenger ferries in commuter service; regulations restricting who can provide ferry service; competition from state-run ferries which provide subsidized service; and labor law restrictions on state subcontractors.

The Economics of Private Sector Passenger-Only Ferry Service

Difficulty in covering costs with the revenues generated from passenger-only fares is one of the primary reasons few private firms have attempted to offer the service. This inability to cover costs through farebox revenues was behind the demise of the original Black Ball ferry fleet and is a fact of life today for the state-owned ferry system. Originally, when the state acquired the Black Ball fleet in 1951, the purchase was qualified by a clause stating that the ferries would generate their own revenue through user fees. Although this policy prevailed in the early history of state management, it proved to be an unachievable goal.

Passenger-only commuter ferry service, as with all public commuter transportation, has difficulty covering costs through fares alone, because of the high one-way peak-hour demand, and minimal off-peak ridership. This means that for much of the day and evening (except for narrow morning and afternoon peak periods) the vehicles are not at capacity, and operating revenues cannot cover operating costs.

Moreover, passenger ferry service must compete with auto ferries, highway travel and other transit options for customers. If the fares established for passenger-only ferry service are set high enough to cover capital and operating costs, riders decide passenger-only ferries are too expensive relative to the other transportation options available. Because the state has an interest in easing auto traffic congestion, it is able to justify the fare structure and corresponding subsidy to attract foot passengers to passenger-only ferries.

However, most private firms do not have such an interest and cannot justify offering passenger-only ferry service where the fares do not cover costs. Where private passenger ferry service is successful, it is generally as a tourist service offering tours or charter service (weddings, corporate events), or as a combination commuter service during peak hours and tourist service during off-peak or evening hours. Successful service of this type requires an active tourist or corporate market.

In the Puget Sound area, the majority of the demand for passenger ferry service is commuter-based. Therefore, private firms interested in providing such service have required some manner of public financial assistance. This assistance has been sought for vessel acquisition, docking facilities and to subsidize service. This situation illustrates the conundrum of public-private passenger ferry service in the state: it is a very appealing concept, and could provide benefits to riders, but it requires public subsidy. Given the need for such subsidies, the public benefit becomes questionable.

Summary and Conclusion: Governance Analysis

A range of new ways to govern, finance and operate an expanded passenger-only service have been reviewed. In meetings with state, local and regional stakeholders, the theme emerged that changing the governance structure is not an important issue. "Its not broken so don't fix it," was the prevailing sentiment. In fact, some stakeholders have indicated that changing the current structure would create larger problems, such as coordination with auto ferry scheduling and terminal operations, customer confusion about service delivery and program accountability, and administrative efficiencies.

Stakeholder comments aside, the majority of the alternatives evaluated do not constitute "good governance," since they would not represent an improvement over the current system in the areas of financial adequacy, administrative efficiency, and balancing stakeholder interests. If however, in the future the issue of passenger-only ferry financing is revisited and a local government funding component is deemed necessary, governance options should also be revisited.

Finally, if a private passenger ferry operation were to be proposed that could be assured of offering reliable commuter service on the routes proposed at a demonstrated public benefit, then it too should be considered further.

PASSENGER-ONLY FERRY PROGRAM IMPLEMENTATION PLAN

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